

Planification de la sécheresse dans un contexte de rareté de l'eau : Expériences des bassins du sud-est de l'Espagne et du MENBO.

Planning of Droughts in a context of Water Scarcity: Experience in the basins of the southeast of Spain and MENBO.



Ramiro Martínez

General Coordinator

Mediterranean Network of Basin Organizations - **MENBO**



MINISTÈRE DE L'AGRICULTURE,
DES RESSOURCES HYDRAULIQUES
ET DE LA PÊCHE



WORLD BANK GROUP



GWSP
GLOBAL WATER
SECURITY & SANITATION
PARTNERSHIP

Atelier sur la gestion de la sécheresse. Tunis, Tunisie. 30 Avril 2018



CONTENTS

- Basics concepts: Drought and Scarcity.
- Drought Management Policy and Planning.
- Special plans against drought.
- The Jucar River Basin - Special Drought Plan case.
 - Context.
 - Legal framework.
 - Contents.
 - Indicators System.
 - Measures in the Drought Plan.
- International panorama.
- Conclusion.





Basics concepts: Drought and Scarcity

SCARCITY Insufficient water resources to attention of the demands.

- Anthropic: depends on the magnitude of the uses.
- Related with the water stress index.
- Structural, permanent.



< 170 mm/year

DROUGHT Period of time with abnormally lower rainfall than usual.

- Meteorological (natural*).
- Indicators for operational definition.
- Unpredictable (*).
- Conjunctural.

DROUGHT over SCARCITY





The 5 goals:

- 1) Proactive mitigation and planning measures as key elements of effective national drought policy.
- 2) National, regional and global collaboration among observation networks.
- 3) Financial strategies into drought preparedness plans (insurances).
- 4) Establishment of a safety and emergency relief network at diverse governance level.
- 5) Coordination of user-oriented drought programs.





Basic elements of the Special Drought Plan

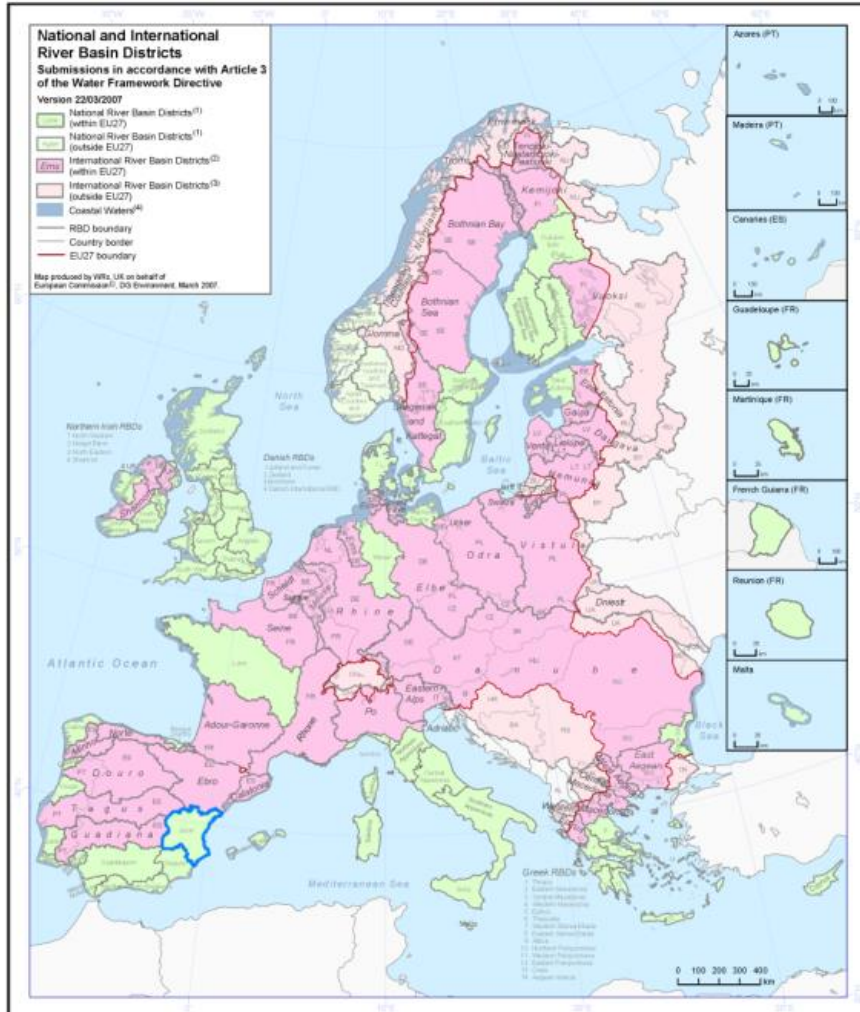


- 1) Drought characterisation and diagnose.
- 2) Indicator system in situations of prolonged drought and occasional water scarcity.
- 3) Measures and actions to develop during the different phases of drought and water scarcity.
- 4) Drought follow-up and post-drought reports. Assessment of socioeconomic and environmental impacts.
- 5) Reference framework for supply emergency plans.



The Jucar River Basin District context

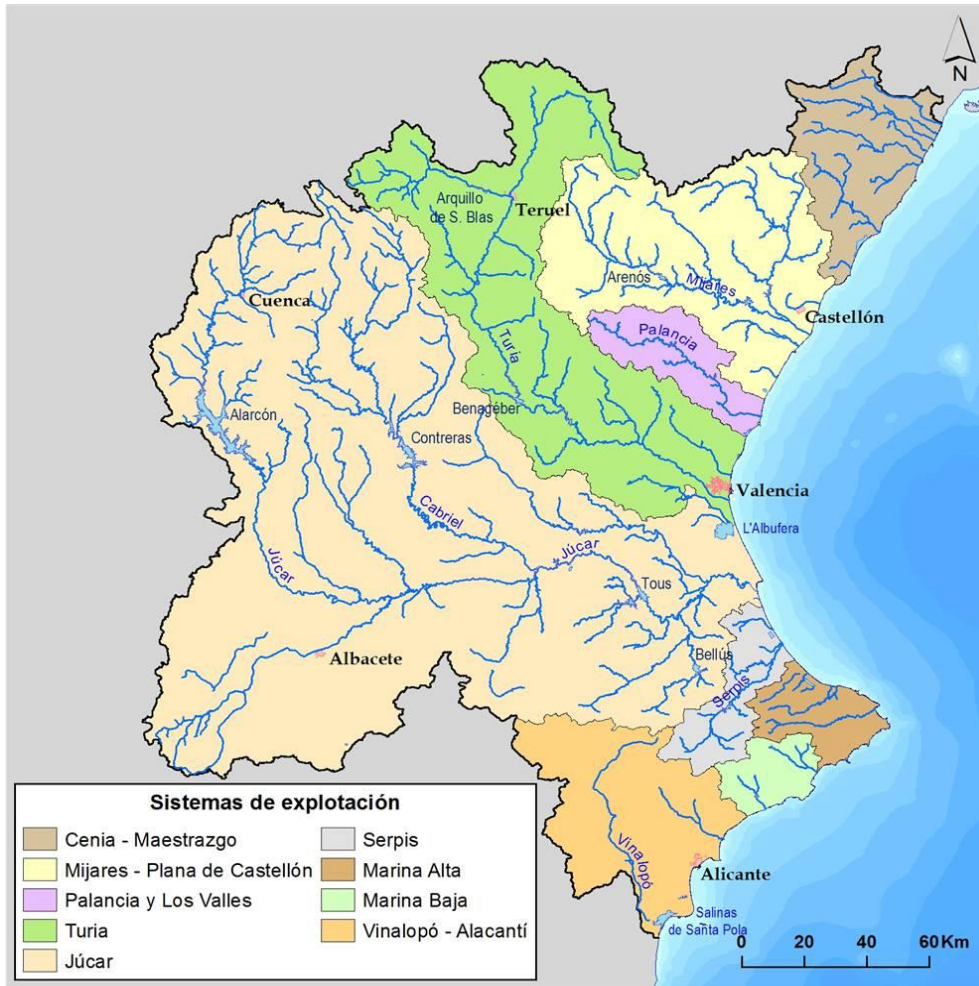
Where we are...



Footnotes:

- Map based largely on submissions of digital River Basin Districts (RBDs) from EU Member States and Norway.
- Some of the international RBDs shown on this map were not identified as being international by the Member States, i.e. the Adour-Garonne, Rhone and Seine in France, the Vistula in Poland, the Kenjoki and Vuoksi in Finland. Both the German Elbe and Schlei/Trave RBDs are shared with the Danish international RBD. Part of the Italian Adige RBD is shared with the Slovenian Adriatic RBD. It is understood that the Tonkin/Me international RBD in Finland is shared with Sweden, most likely with part of the Bothnian Bay international RBD. As the Bothnian Bay covers several river catchments, the Tonkin/Me and Bothnian Bay have been kept separate in this map. The delineation of the Finmark RBD between Norway and Finland is currently under review.
- These are the boundaries of the river catchments extending beyond the EU27 border. They have been derived from the Catchment Characterisation and Modelling (CCM) database, developed by the Joint Research Centre (JRC), except the boundaries for the Danube international RBD which were supplied by the International Commission for the Protection of the Danube River (ICPDR).
- Coastal waters are defined in the Water Framework Directive (WFD) as extending 1 nautical mile from the coastline. However, some Member States have included a larger part of their coastal waters within the RBD boundaries.

Description of the JRBD

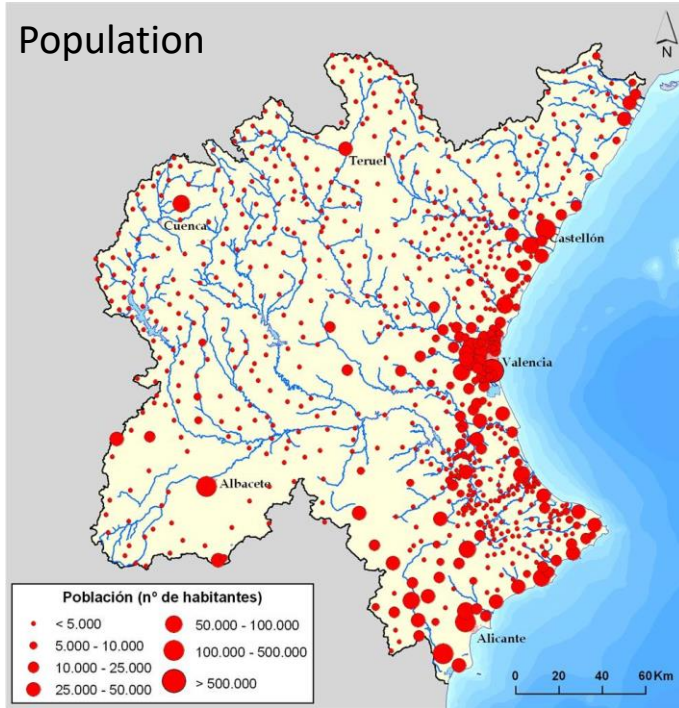


Surface (km ²)	42.735
Permanent population (2012)	5.178.000
Total equivalent population (2012)	5.697.000
Irrigated surface (ha)	390.000
Total inflow (hm ³ /year)	3.800
Total water demand 2012 (hm ³ /year)	3.240

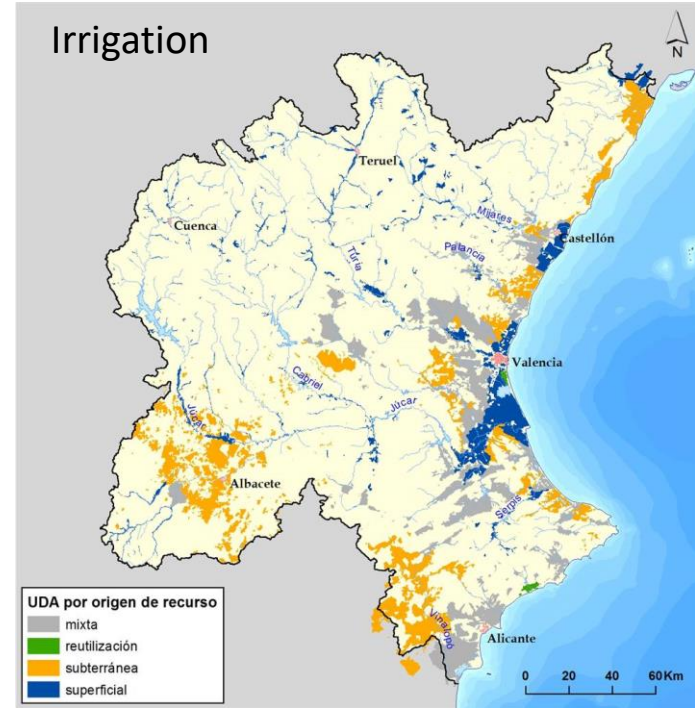
Water resources systems

Water demands in the JRBD

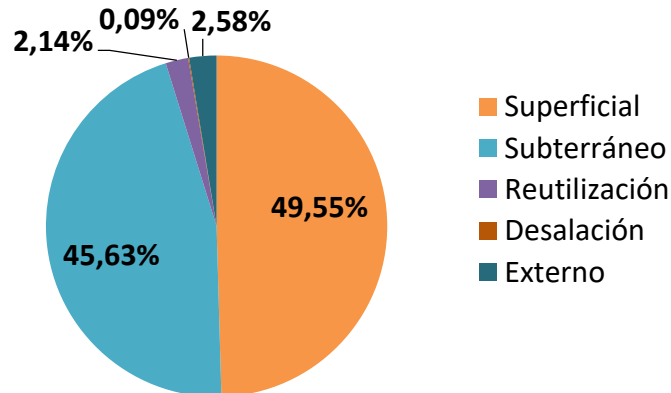
Population



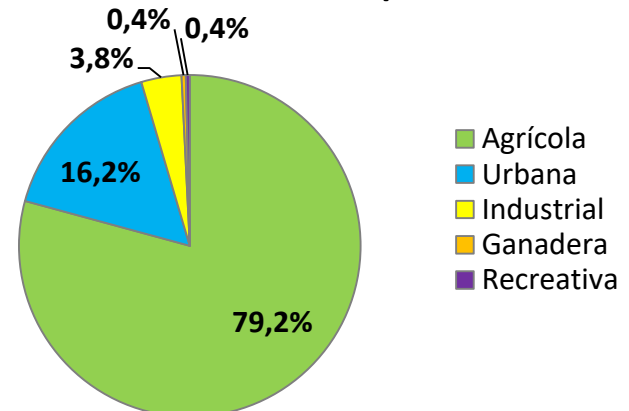
Irrigation



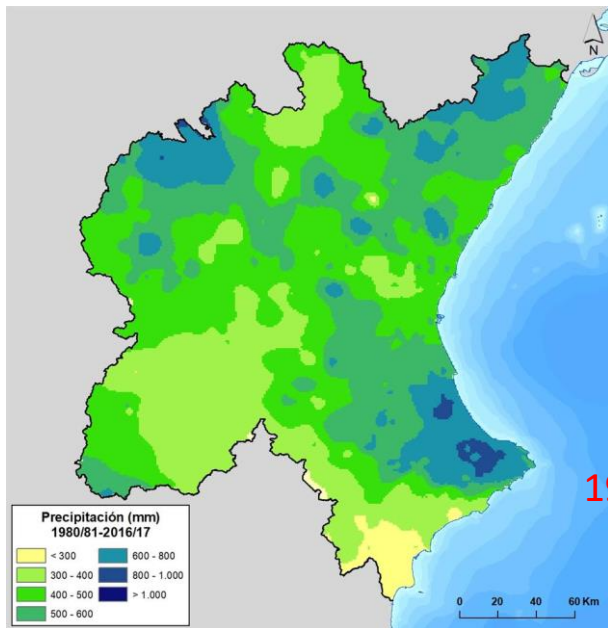
Total Demand per source



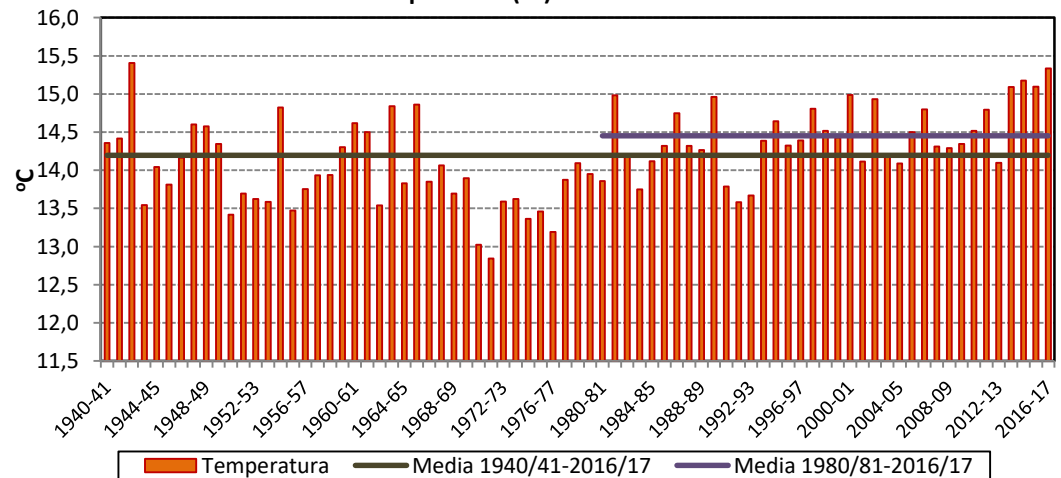
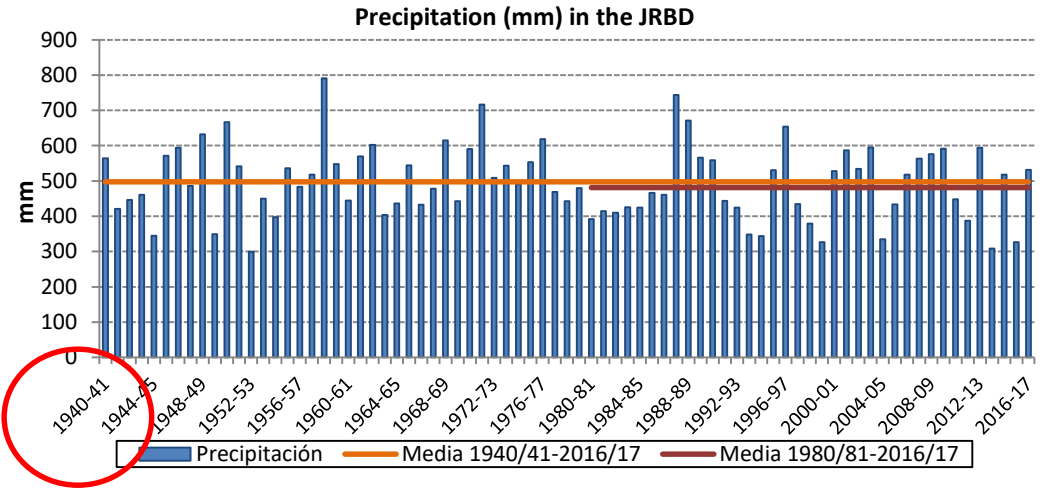
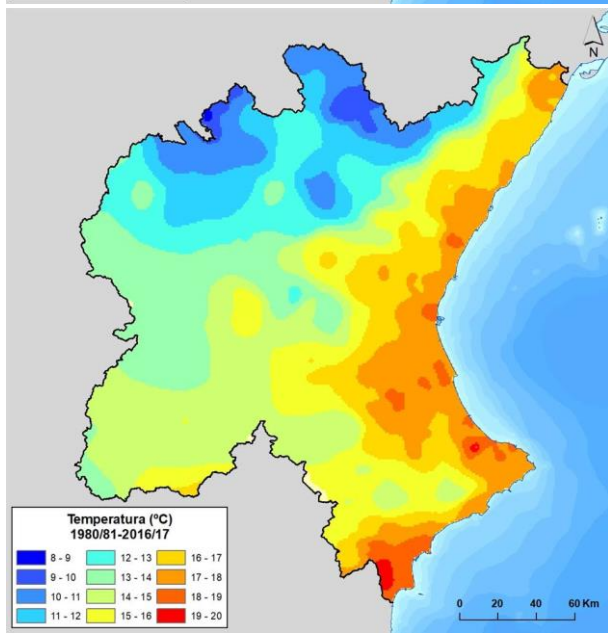
Total demand per use



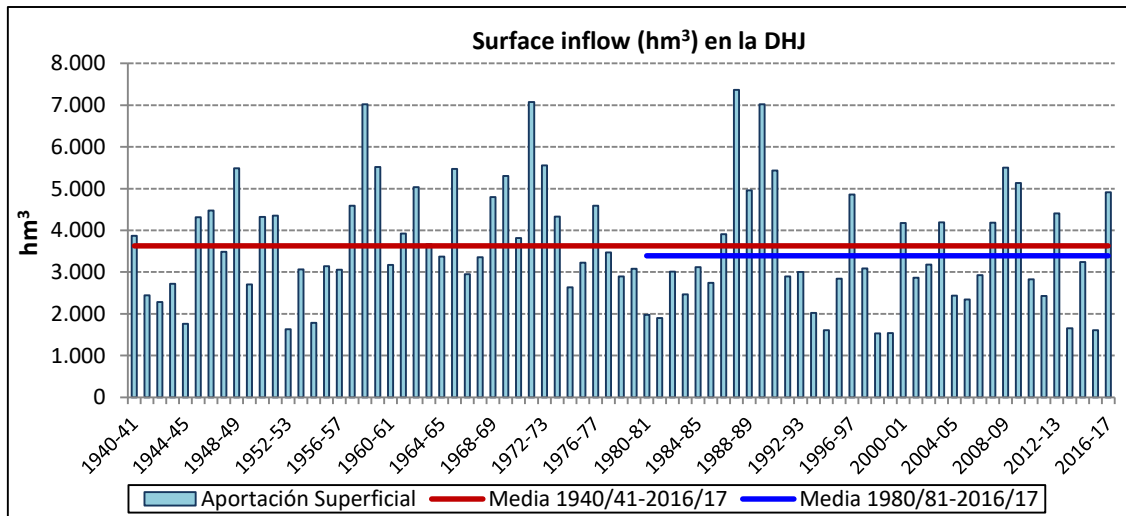
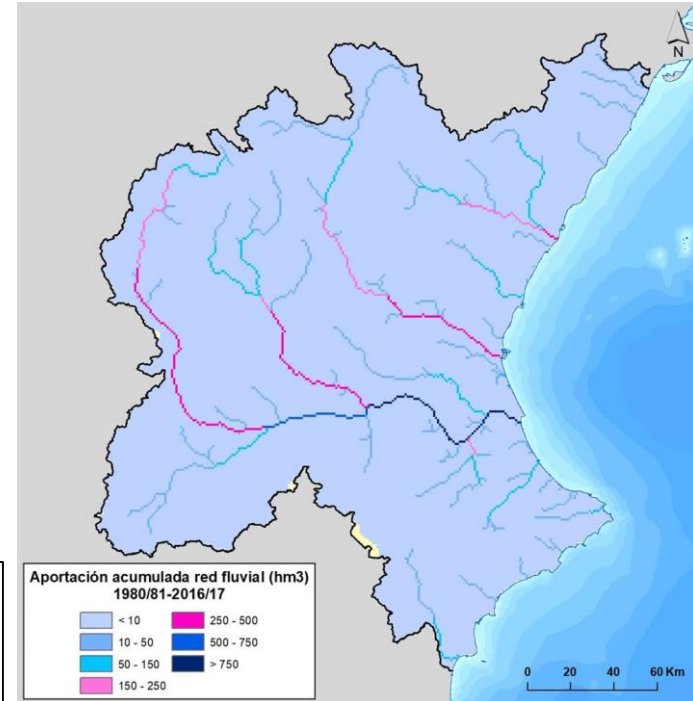
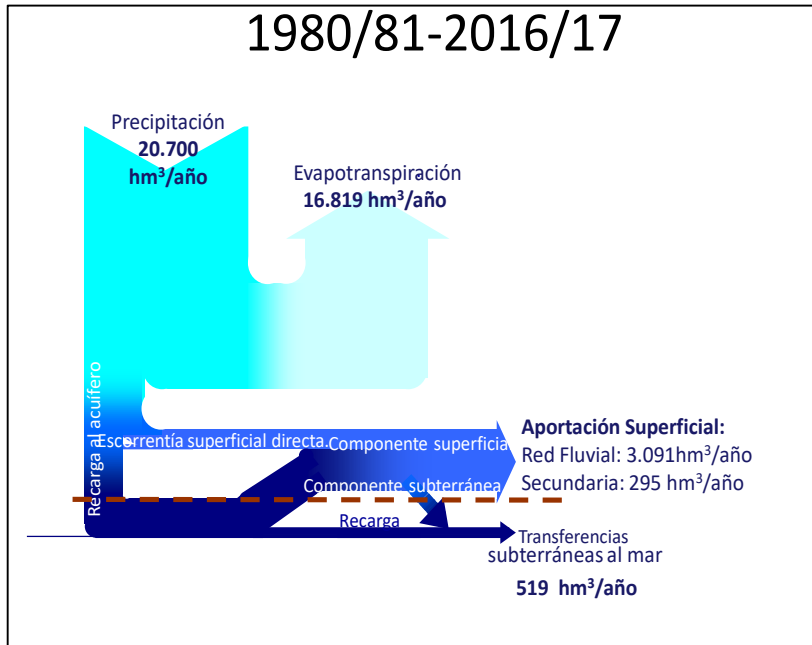
Water resources in the JRBD



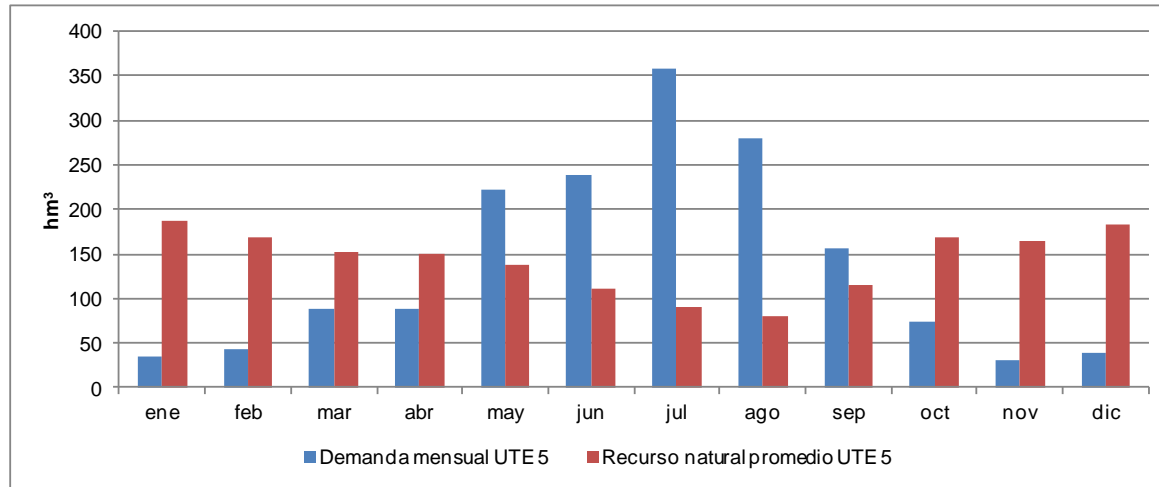
1935



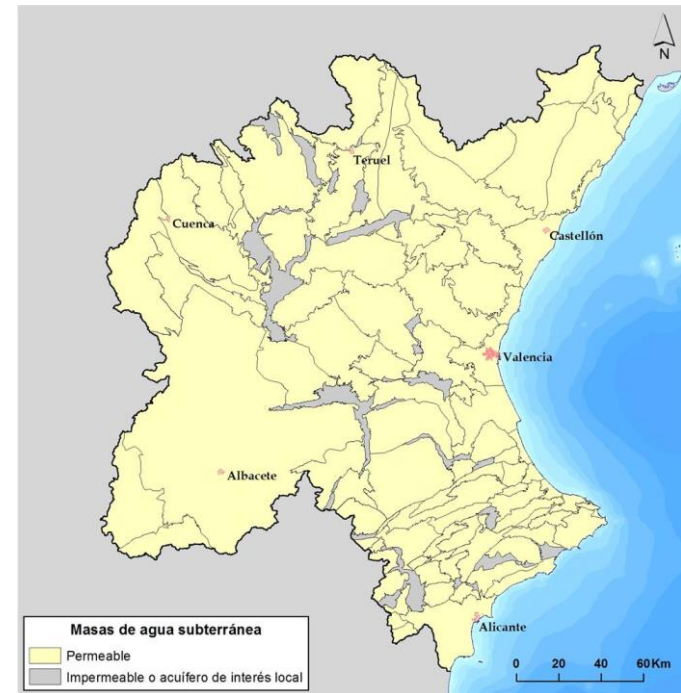
Water resources in the JRBD



Balance

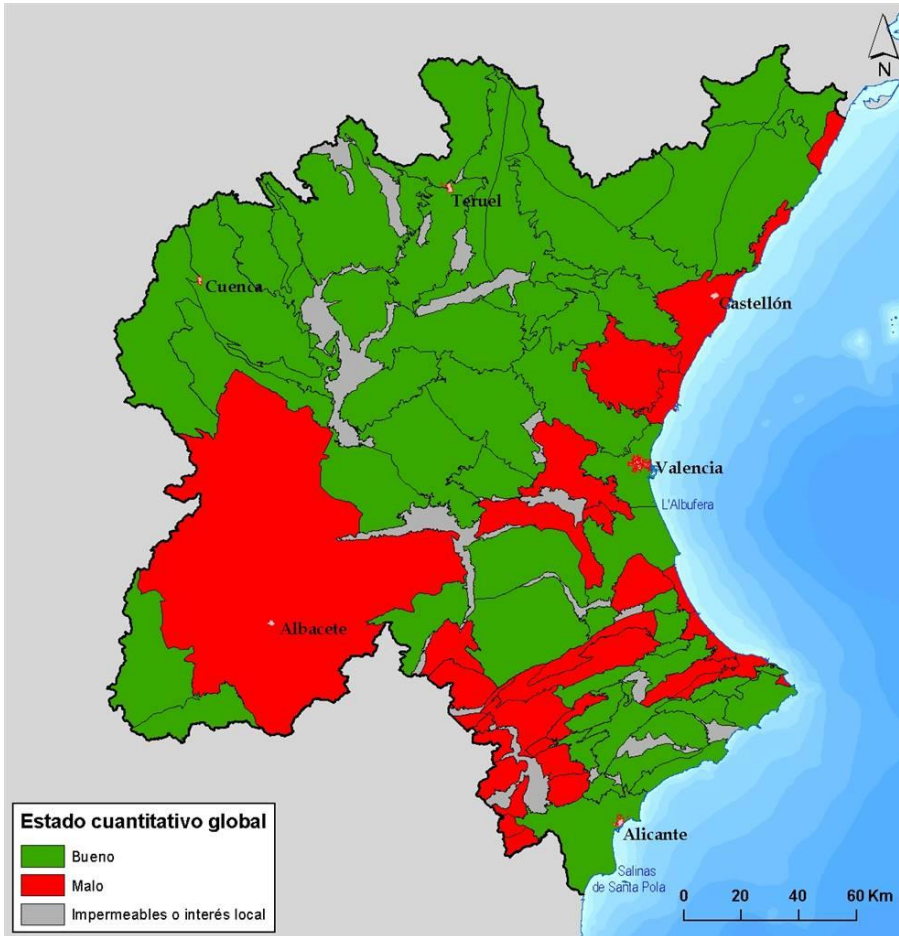


Reservoirs

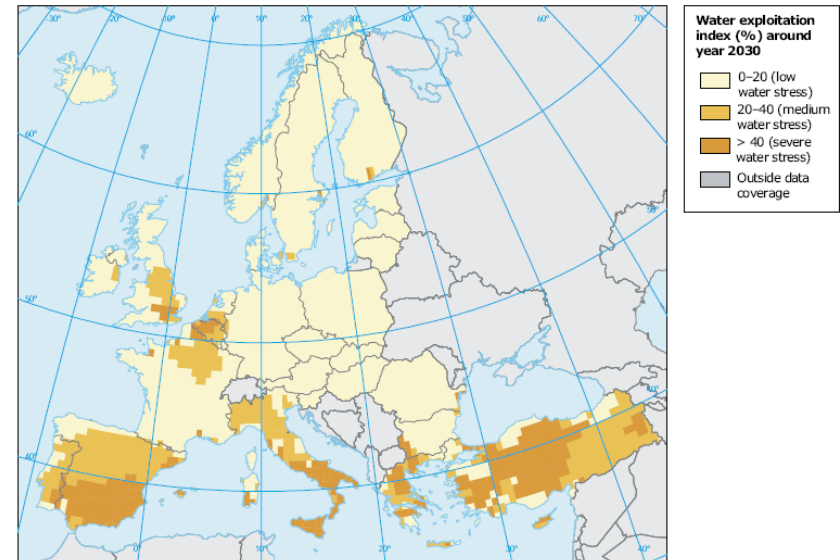


Groundwater bodies

It leads to...



Quantitative groundwater status



Water Exploitation index in the EU (expected for 2030).
Source: EEA

Legal Framework for drought management in Spain

Drought management as emergency situation

- Spain has suffered important drought periods with severe impacts on water resources and water uses.
- Traditionally, droughts have been considered as an emergency situation to be restored with extraordinary water resources and measures.

Policy bases for Drought Management Plans

Law 10/2001, July 5, of the National Hydrological Plan, establishes the bases for the drought planned management:

- The **Ministry of Environment** will establish a **global hydrologic indicator system** to foresee drought situations and to serve as general reference for the formal declaration of droughts.
- **River Basin Organisations** will develop **Drought Management Plans (DMP)**.
- **Public Administration in charge of public water supply** for **population greater than 20.000 inhabitants** will develop an **Emergency Plan for Drought Situations**.

Drought Management Plans

Objective: minimise environmental, social and economic impacts of drought situations

Entities in charge: River Basin Organisations

Contents: includes diagnosis of situation, hydrological indicator system, programme of measures and management and follow-up system.

Approval: Ministerial Order in 2007 (*now under revision*)

A picture is worth a thousand words



Júcar river in summer 1995



Júcar river in summer 2006

A picture is worth a thousand words

Miércoles, 14 de julio de 1999
Levante - EL MERCANTIL VALENTINO - 35

La Marina Alta

Aumentan la explotación de los pozos para garantizar el suministro de agua en Xàbia

«habrá que esperar tres o cuatro días para que se regularice el servicio»

Jaume Benaloy es el primer cura que se ordena en Benidorm en 30 años

ALICIA MASEGOSA
BENIDORM

Jaume Benaloy Marco nació en la época del destape, del inicio de la movida y de las noches sin fin, y todo ello elevado a la enésima potencia, porque además lo hizo en Benidorm, cuando la ciudad gozaba de su máximo esplendor turístico y era sede de acogida de todo aquel deseoso de dar rienda suelta a su recién estrenada libertad.

Hijo de madre murciana y padre benidormés, Jaume creció en el seno de una familia que se denomina a sí misma «católica, pero a la carta». Nada impidió que sintiera su vocación religiosa con tan sólo 17 años y, después de obtener unas excelentes notas en la selectividad, decidiera cambiar sus todavía no iniciados estudios de Económicas y Derecho por los de Teología. Ahora, con tan sólo 24 años se ha convertido en el primer sacerdote natural de Benidorm que ha sido ordenado desde hace más de tres décadas.

Hace tan sólo unos días, el joven cantó su primera misa en la ciudad que le vio nacer, y poco después lo hizo en la P parroquia de la Inmaculada de Alicante, donde actualmente oficia.

Cuando Jaume se decidió a comunicar a su familia lo que había estado meditando con respecto a su futuro, ya lo hizo a sabiendas de que les iba a desconcertar. «Nos hizo sentar en la mesa y nos dijo que nos iba a dar una noticia que nos sorprendería», dice su padre, Pep Benaloy, quien regenta un bar en Benidorm.

A la gente que le rodea le costó entender su decisión, pero hoy su padre confiesa que «aunque entonces me desilusionó, ahora me estoy llevando las alegrías más grandes de mi vida».

En Xàbia la población debe acudir a los depósitos para llenar las garrafas de agua potable. E. W.



Water shortage in Javea during the drought period in the 90's.

Main contents of the Jucar Drought Management Plan

Basic elements of the Special Drought Plan

- Drought characterisation and diagnose
- Indicator system in situations of prolonged drought and occasional water scarcity
- Measures and actions to develop during the different phases of drought and water scarcity
- Drought follow-up and post-drought reports. Assessment of socioeconomic and environmental impacts
- Reference framework for supply emergency plans

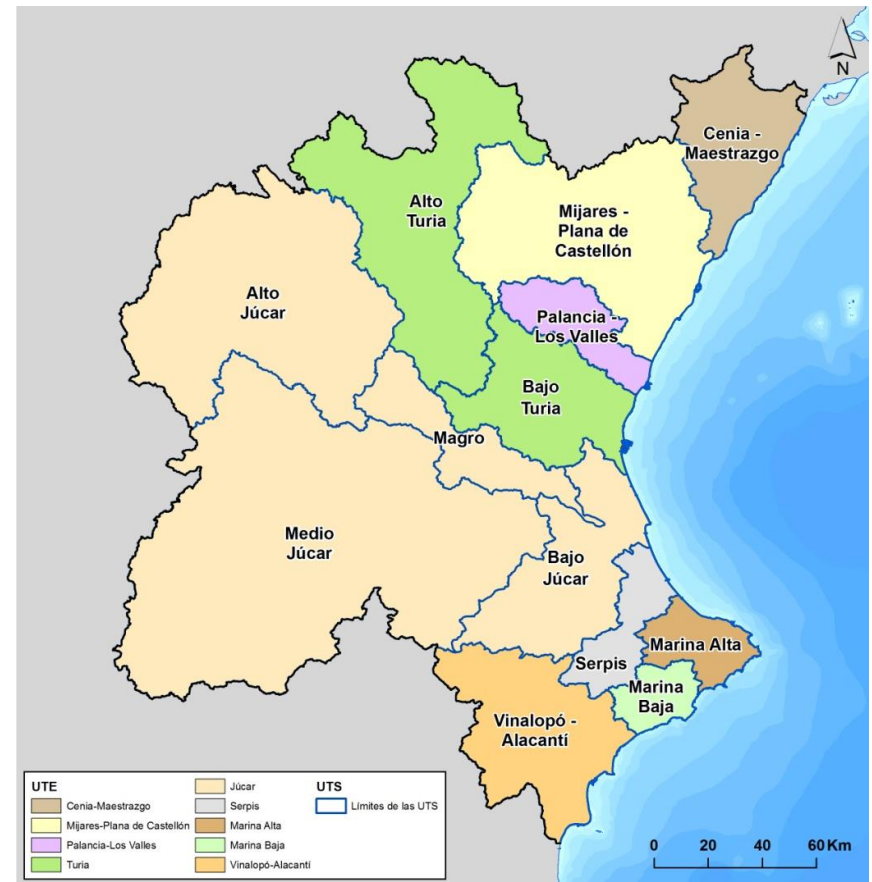
Indicators

Indicator system

Double system: indicators of prolonged drought and scarcity indicators

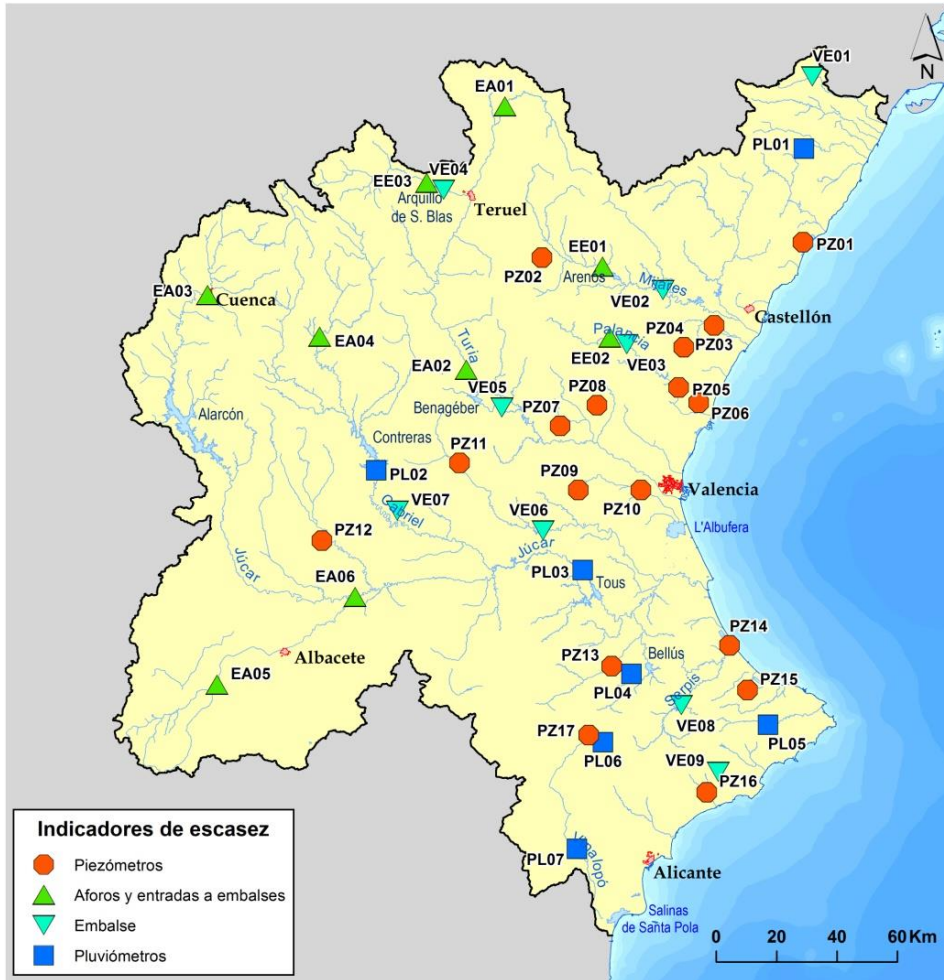
Indicators for prolonged drought: identify persistent and intense situations of decreased rainfall, reflecting contributions in natural regime (SPI12)

Indicators for scarcity: identify situations of difficulty to meet demands due to occasional shortage.



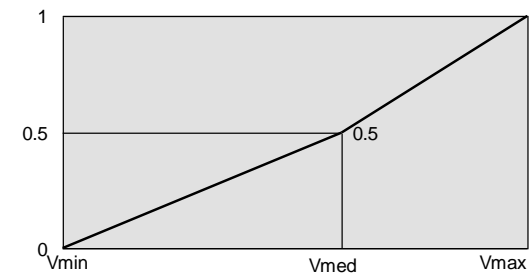
Water Scarcity Indicator System

Scarcity indicators: Based on rainfall data, piezometry, gauging and inflow to reservoirs and dammed volume



$$- Si V_i \geq V_{med} \Rightarrow I_e = \frac{1}{2} \left[1 + \frac{V_i - V_{med}}{V_{max} - V_{med}} \right]$$

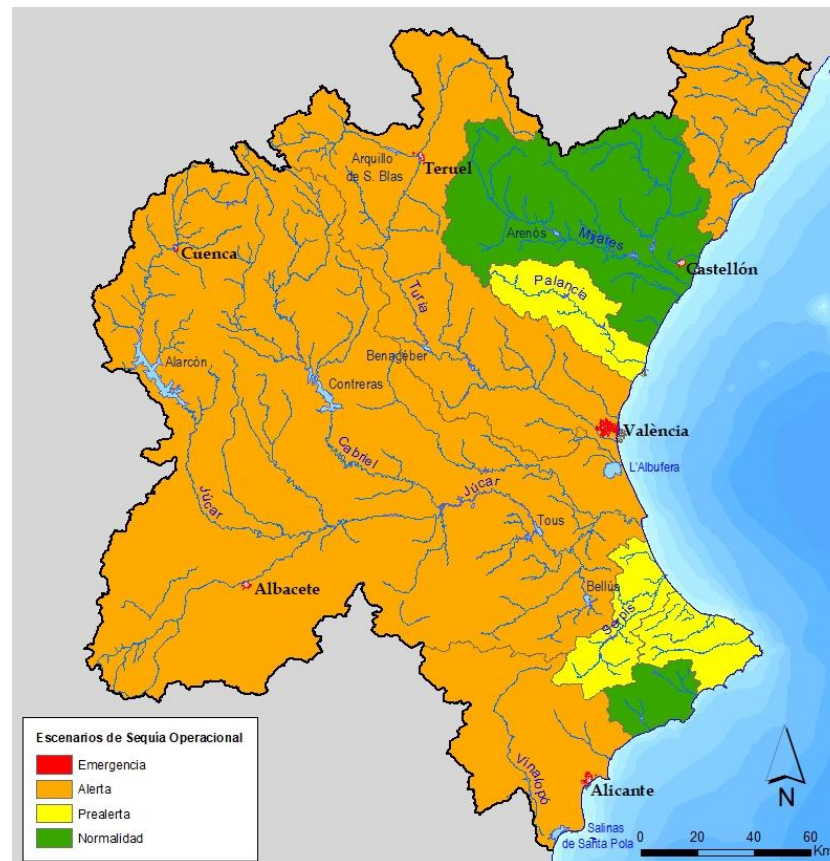
$$- Si V_i < V_{med} \Rightarrow I_e = \frac{V_i - V_{min}}{2(V_{med} - V_{min})}$$



Status Index	Status
0,75 – 1,00	NORMAL
0,50 – 0,75	NORMAL
0,30 – 0,50	PRE-ALERT
0,15 – 0,30	ALERT
0,00 – 0,15	EMERGENCY

Aggregation per water resources system

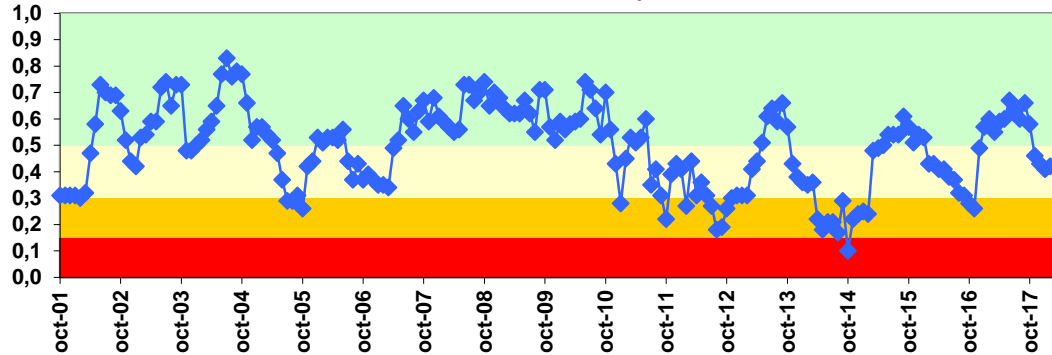
	WATER RESOURCES SYSTEM	Ind Estado 31/03/2018	Coefficiente Sist. Expl.	ÍNDICE SIST. EXPLOTACIÓN
1	Cenia-Maestrazgo	0,01	0,25	0,30
2		0,50	0,61	
3		0,00	0,14	
4	Mijares-Plana de Castellón	0,11	0,23	0,54
5		0,54	0,47	
6		0,88	0,30	
7	Palancia-Los Valles	0,17	0,28	0,42
8		0,49	0,44	
9		0,57	0,28	
10	Turia	0,30	0,12	0,28
11		0,06	0,07	
12		0,34	0,04	
13		0,25	0,16	
14		0,28	0,40	
15		0,38	0,10	
16	0,39	0,11		
17	Júcar	0,54	0,17	0,43
18		0,51	0,10	
19		0,52	0,01	
20		0,27	0,02	
21		0,57	0,10	
22		0,31	0,01	
23		0,28	0,12	
24		0,53	0,01	
25		0,22	0,01	
26		0,42	0,41	
27		0,53	0,02	
28	0,11	0,02		
29	Serpis	0,47	0,27	0,41
30		0,39	0,73	
31	Marina Alta	0,21	1,00	0,21
32	Marina Baja	0,47	1,00	0,47
33	Vinalopó-Alacantí	0,14	0,35	0,14
34		0,15	0,65	



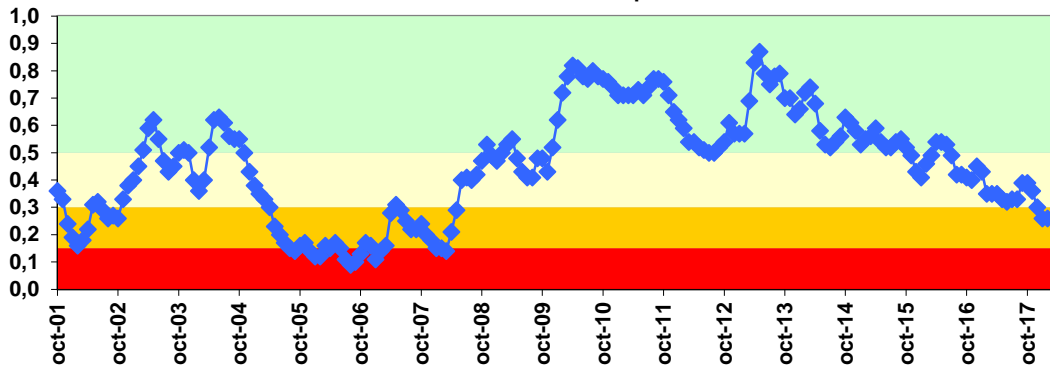
System	May	Jun	Jul	Ago	Sept	Oct	Nov	Dic	Ene	Feb	Mar
Cenia-Maestrazgo	0,51	0,49	0,48	0,48	0,50	0,42	0,35	0,30	0,29	0,29	0,30
Mijares-Plana de Castellón	0,77	0,76	0,73	0,71	0,74	0,74	0,62	0,60	0,42	0,54	0,54
Palancia-Los Valles	0,60	0,67	0,64	0,60	0,66	0,58	0,46	0,43	0,41	0,42	0,42
Turia	0,36	0,35	0,34	0,31	0,35	0,31	0,31	0,28	0,23	0,22	0,28
Júcar	0,40	0,38	0,39	0,40	0,39	0,40	0,36	0,30	0,26	0,26	0,43
Serpis	0,69	0,68	0,67	0,73	0,61	0,55	0,45	0,37	0,40	0,43	0,41
Marina Alta	0,67	0,69	0,69	0,74	0,75	0,74	0,72	0,43	0,27	0,30	0,21
Marina Baja	0,89	0,86	0,85	0,86	0,86	0,73	0,66	0,56	0,50	0,50	0,47
Vinalopó-Alacantí	0,62	0,63	0,64	0,67	0,68	0,64	0,57	0,34	0,23	0,29	0,14

Drought Management Plan in Júcar river basin: application of measures

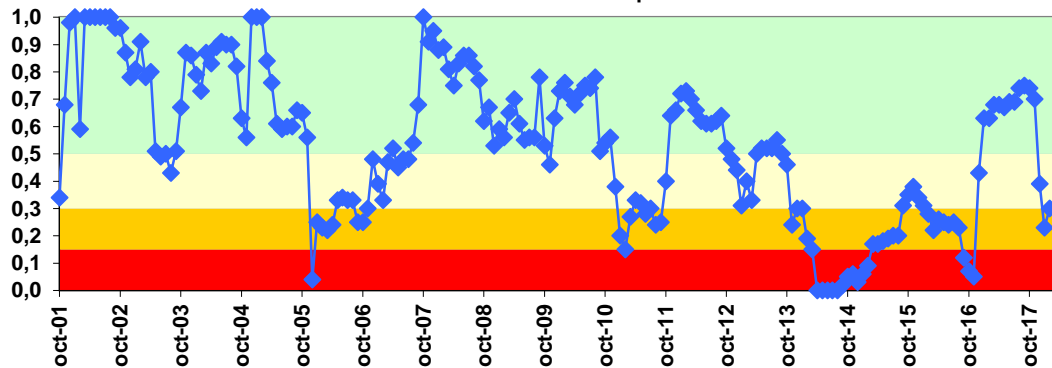
PALANCIA-LOS VALLES
Evolución Índice de sequía



JÚCAR
Evolución Índice de sequía



MARINA ALTA
Evolución Índice de sequía



Status Index	Status
0,75 – 1,00	NORMAL
0,50 – 0,75	
0,30 – 0,50	PRE-ALERT
0,15 – 0,30	ALERT
0,00 – 0,15	EMERGENCY

Drought indicator system is used to activate the measures to be applied.

Measures in the Drought Plan

Programme of Measures of the SPD

- The objective of the Special Drought Plan is to minimise the economic, environmental and social impacts of droughts.
- To this end, the SDP, in addition to making a spatial and temporal identification of droughts and water scarcity, programmes actions and measures that lead to mitigating their impacts.
- The SPD differentiates between:
 - Actions to implement in a prolonged drought scenario
 - Measures to apply in the occasional water scarcity scenarios (general and specific)

Actions and measures to apply in prolonged droughts

Actions activated in the prolonged drought scenario

Justified admission of the temporary deterioration water bodies' status due to exceptional natural causes

Less demanding ecological flow regime

- These two types of actions are also included in the current River Basin Management Plan although their application is conditioned by the definition of "prolonged drought" that appears in the regulations.
- The revision of the SDP proposes a new definition of prolonged drought: it is activated when the value of the prolonged drought indicator is lower than 0.3.

Ecological flows: example in river Mijares

Código	Nombre masa de agua	Espacio con protección	Caudal mínimo (m ³ /s)		
			Situación ordinaria	Situación de sequía	
10.01	Río Mijares: Cabecera - Bco. Charco	Sí	0,02	**	
10.02	Río Mijares: Bco. Charco - Loma de la Ceja	Sí	0,02	**	
10.03	Río Mijares: Loma de la Ceja - Río Mora	No	0,31	0,31	
10.03.01.01	Río Alcalá: Cabecera - Río Valbona	Sí	0,02	**	
10.03.02.01	Río Albentosa: Cabecera - Manzanera	Sí	0,02	**	
10.03.02.02	Río Albentosa: Desde Manzanera hasta confluencia	No	0,06	0,06	
10.03.03.01	Río Mora	Sí	0,03	**	
10.04	Río Mijares: Río Mora - E. Arenós	Sí	0,4	**	
10.04.01.01	Río del Morrón	Sí	0,02	**	
10.06	Río Mijares: E. Arenós - Az. Huertacha	Sí	0,4	**	
10.06.01.01	Bco. Maimona	Sí	0,02	**	
10.06.02.01	Río Montán	Sí	0,01	**	
10.06.03.01	Río Cortes	Sí	-	-	
10.07	Río Mijares: Az. Huertacha - E. Vallat	Sí	0,56	**	
10.07.01.01	Río Pequeño	Sí	-	-	
10.07.02.01	Río Villahermosa: Cabecera - Bco. Canaleta	Sí	0,03	**	
10.07.02.02	Río Villahermosa: Bco. Canaleta - Bco. Cimorreta	Sí	0,06	**	
10.07.02.03	Río Villahermosa: Bco. Cimorreta – Villahermosa	Sí	0,07	**	
10.07.02.04	Río Villahermosa: Villahermosa - Río Mijares	Sí	0,07	**	
10.08	Río Mijares: E. Vallat - E. Sichar	Sí	0,63	**	
10.10	Río Mijares: E. Sichar – Canal cota 100	E. Sichar - toma Tramo común	No	1,1	0,95
		Toma Tramo común - Canal cota 100	No	0,95	0,95
10.11	Río Mijares: Canal cota 100 - Rbla. de la Viuda	No	0,2	0,2	
10.12.01.04.01.03	Río Lucena: E. Alcora - Rbla. de la Viuda	No	0,01	0,01	
10.13	Delta del Mijares	Sí	0,1	**	

(**) As established in Article 18.4 of the Hydrological Planning Regulation, the less demanding flow regime in situations of prolonged droughts does not apply in areas of the Natura 2000 network. Nor does it apply to special protection areas or natural river reserves.

Type of measures in water scarcity

Scarcity scenarios				
Status situation	No scarcity	Moderate scarcity	Severe scarcity	Serious scarcity
Scarcity scenarios	Normal	Prealert	Alert	Emergency
Type of actions and measures activated	General hydrological planning and monitoring	Awareness, savings and monitoring	Management measures (demand and supply), and control and monitoring (Article 55 of the MTWA)	Intensification of measures considered on alert and possible adoption of exceptional measures (Article 58 of the MTWA)

Data sheets with specific measures for scarcity per UTE

The SDP includes data sheets with specific measures to deal with scarcity situations in each of the territorial units.

UTE 2 Mijares-Plana de Castellón		
Status	Examples of specific measures to adopt	Competent Authority
Prealert	Activate emergency plans for the supply systems of Almassora, Burriana, Castelló de la Plana, Vall d'Uixó, Onda, Vila-real and Consortium of Aguas de la Plana as well as those systems that in the future reach 20,000 equivalent inhabitants	Relevant Municipalities
	Analysis of the possibilities of using new resources contributed by reuse from the WWTP of Almenara, Almassora, Borriana, Xilxes, Llosa, Moncofa, Vall d'Uixó and Castelló de la Plana.	CHJ y GV
	...	CHJ y GV
Alert	Materialisation of the possibilities of taking advantage of new resources contributed by desalination from the IDAM of Oropesa and Moncofa	CHJ
	Restriction of up to 100% of the surface supply to the mixed irrigations of the Mijares, with respect to its surface consolidated demand, taking into account the application of the Bases Agreement for the Regulation of the Mijares River.	CHJ
	Reinforcement of surveillance actions for the conservation and protection of the resource and aquatic ecosystems considering the protection of wetlands, the protection of fluvial species and the impact of other measures on the natural environment, with special attention to the Marjal d'Almenara.	CHJ y GV
Emergency	...	
	Intensification of the possibilities of using new resources contributed by desalination from the IDAM of Oropesa and Moncofa.	CHJ
	Start of the restrictions to protect the available surface resources: between 15 and 25% of the supply to the traditional irrigations of the Mijares with respect to its consolidated demand.	CHJ
	Restriction of up to 100% of the surface supply to the mixed irrigations of the Mijares, with respect to its surface consolidated demand, taking into account the application of the Bases Agreement for the Regulation of the Mijares River.	CHJ
	Start of saving measures to protect the underground resources available in bodies of groundwater in poor quantitative state, especially in Plana de Castelló: reduction of up to 15%.	CHJ y users
...		

Examples of specific measures: restrictions

Proposed reduction percentage to users from UTE 4 Turia

Demand Unit	Source	Porcentajes de reducción			
		Normal	Prealert	Alert	Emergency
Supplies	Surface	0%	0%	0%	0%
Real Acequia de Moncada	Surface	0%	10-20%	25-35%	35-45%
	Total		10-20%	15-25%	20-30%
Vega de Valencia	Surface	0%	10-20%	35-45%	45-55%
	Total		10-20%	15-25%	20-30%
Pueblos Castillo	Surface	0%	10-20%	15-25%	25-35%
	Total		10-20%	15-25%	20-30%
Irrigation of the main Canal in Camp de Túria	Surface	0%	10-20%	30-40%	45-55%
	Total		5-15%	10-20%	15-25%

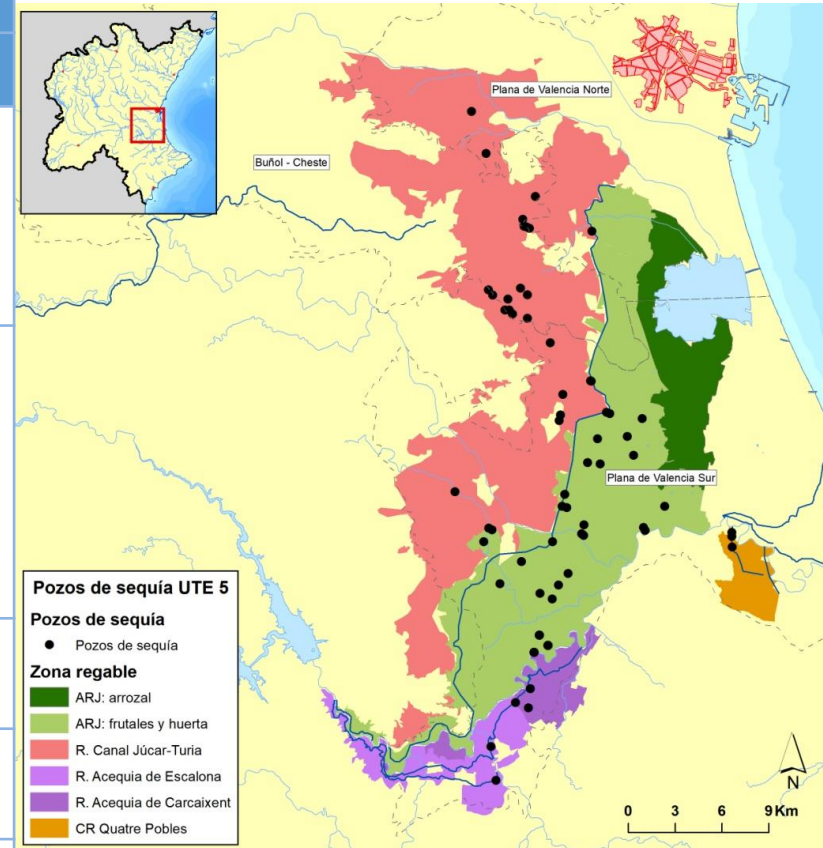
Examples of specific measures: restrictions on underground masses in poor quantitative state

- Initiation of saving measures to protect the resources available in groundwater bodies with poor quantitative status: general reduction up to 15% of abstractions for irrigation, depending on the territorial unit and the scenario.
- These restrictions will apply, especially in those groundwater bodies with significant abstractions for urban use or with special relation to surface water or protected natural spaces.
- This percentage of average reduction of 15% can be distributed spatially depending on the affection of groundwater abstractions to surface water or protected spaces.

Examples of specific measures: drought wells

Abstraction volumes through drought Wells according to scenario in UTE 5 Júcar

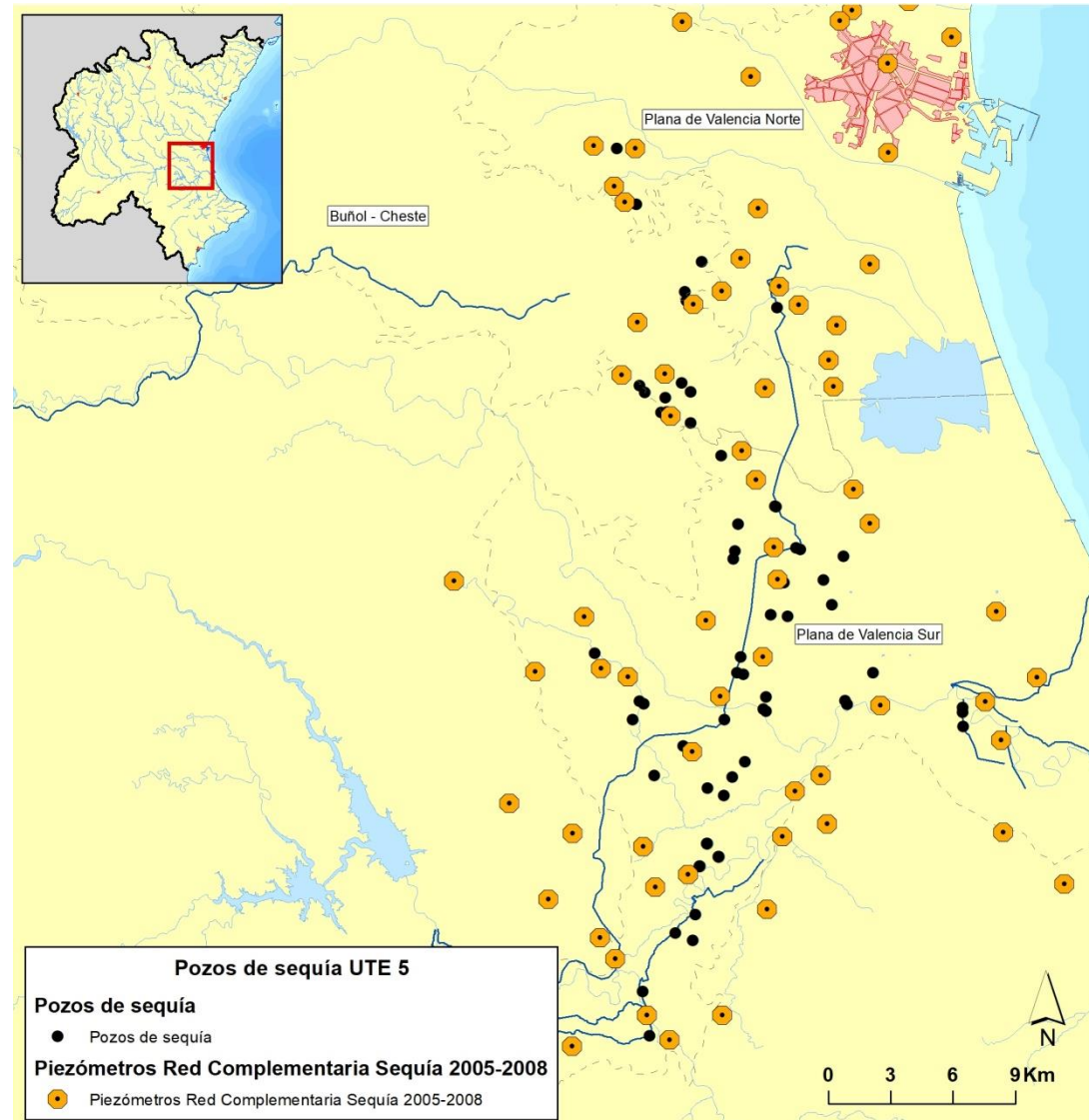
Irrigable area	Code	Name	Nº abstractions	Abstraction volumen according to scenario (hm ³ /year)			
				Total capacity	Prealert	Alert	Emergency
Acequia Real del Júcar	080.141	Plana de Valencia Norte	1	0,4	12,1	24,2	24,2
	080.142	Plana de Valencia Sur	37	23,8			
Canal Júcar-Turía	080.140	Buñol - Cheste	13	5,1	3,4	6,8	12,0
	080.141	Plana de Valencia Norte	5	2,3			
	080.142	Plana de Valencia Sur	9	4,6			
Real Acequia Escalona	080.142	Plana de Valencia Sur	2	2,0	1,0	2,0	2,0
Real Acequia Carcaixent	080.142	Plana de Valencia Sur	3	2,6	1,3	2,6	2,6
Acequia de Quatre Pobles	080.142	Plana de Valencia Sur	3	2,0	1,0	2,0	2,0
Total			73	42,8	18,8	37,6	42,8



Examples of specific measures: drought Wells monitoring

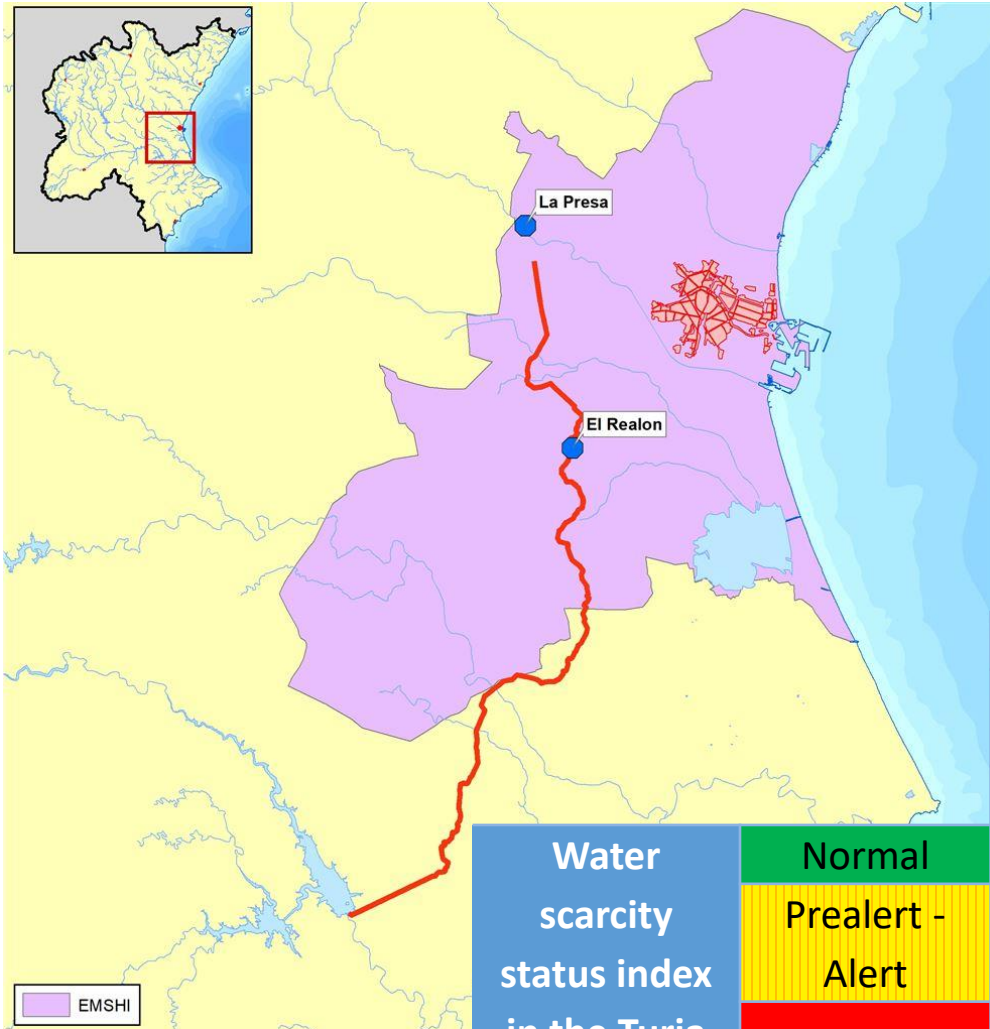
Control of abstractions in drought well extractions in UTE Júcar

- Improvement of the piezometric control in the areas of influence of the drought wells, especially in l'Albufera of València.



Examples of specific measures: changes in source

Percentage of distribution of the supply from the Turia and Júcar to the Metropolitan Area of Valencia.



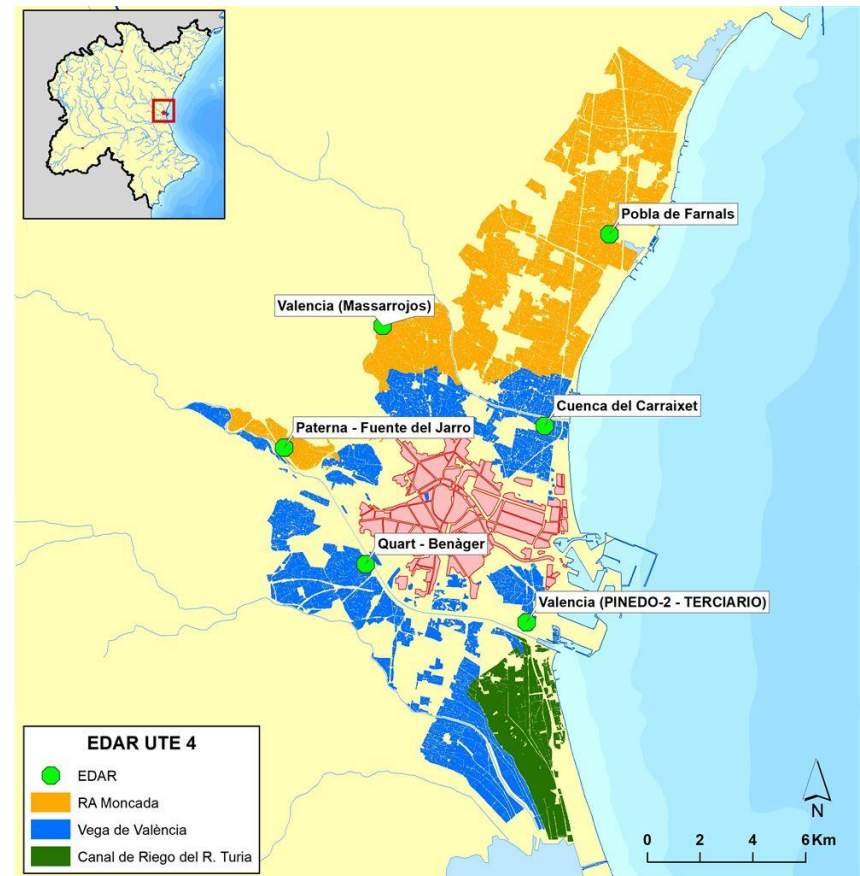
Water scarcity status index in the Júcar system

		Water scarcity status index in the Júcar system					
		Normal		Prealert -Alert		Emergency	
Water scarcity status index in the Turia system	Normal	Turia	Júcar	Turia	Júcar	Turia	Júcar
	Prealert - Alert	20%	80%	35%	65%	50%	50%
	Emergency	10%	90%	20%	80%	40%	60%
		0%	100%	10%	90%	20%	80%

Examples of specific measures: non-conventional resources

Intensification of the possibilities of using new resources contributed by reuse from the WWTP of the system, especially of the Carraixet Basin, Paterna-Fuente del Jarro, Pinedo, Pobla de Farnals and Quart-Benàger.

- As established in the regulations, the River Basin Management Plan, in situations where the scarcity index reaches the pre-alert status, will encourage the use of these resources by the irrigation system according to their current licences.



Examples of specific measures: non-conventional resources

Volumes from desalination according to scenario in UTE 8 Marina Baja.



User	Volume from the Mutxamel desalination plan according to scenario (hm ³ /year)		
	Prealert	Alert	Emergency
Consorcio de Aguas de la Marina Baja	0	2-5	6 - 11,5

Examples of specific measures: environmental impact reduction

Specific environmental measures in the emergency scenario in UTE 5 Júcar

Status	Measures to adopt	Competent Authority
Emergency	Reinforcement of surveillance actions for the conservation and protection of resources and aquatic ecosystems considering the protection of wetlands and fluvial species and the impact of other measures on the natural environment with special attention to L'Albufera of València, the middle stretch of the Júcar as it passes through La Mancha plain and the final stretch of the river, downstream of the Tous dam, including the Massalavés spring.	CHJ, GV y JCCLM
	Application of specific monitoring programmes to record the environmental impacts associated with critical episodes, with special attention to L'Albufera of València, the middle section of the Júcar as it passes through La Mancha plain and the final section of the river, downstream of the Tous dam, including the Massalavés spring.	CHJ, GV y JCCLM

In order to safeguard environmental conditions, a minimum volume is set for exploitation purposes, and in all cases environmental management measures must be initiated as volumes close to the indicated value are reached.

Dam	Minimum volume (hm ³)
Alarcón	30
Bellús	6
Contreras	15
Forata	0,75
Tous	39



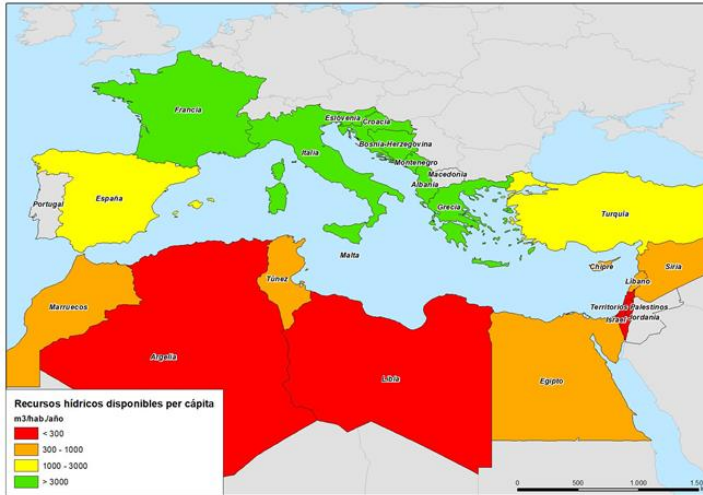
International Panorama

- ❑ Similar experiences in the United States, Australia, Israel, ...
- ❑ Most recent initiatives in Asia, Caribbean, South America, ...
- ❑ Very active international organizations: UN, FAO, WMO, WB ...
- ❑ Maghrebien System of Early Warning to Drought (Algeria, Morocco, Tunisia). 2006
- ❑ The Sahara and Sahel Observatory (OSS)

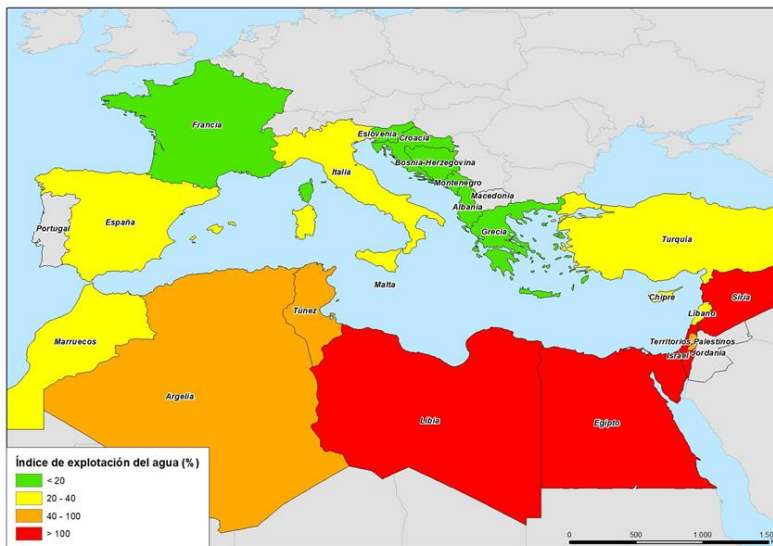




International Panorama (MED)



Resources available per capita



- Moyenne ($0.2 < I_e < 0.4$): Turquie, Chypre, Italie, Liban, Espagne et Maroc.
- Sévère ($0.4 < I_e < 1$): Territoires palestiniens, Algérie et Tunisie.
- Extrême ($I_e > 1$): Syrie, Malte, Israël, Egypte et Libye.

Water Resources Exploitation Index





Main Conclusions

- 1) the need to have this type of plans in the areas most vulnerable to drought.
- 2) the need to have robust systems for continuous data collection (definition and monitoring of scenarios).
- 3) The need to have reliable data on uses and demands.
- 4) The preponderance of agricultural use in the Mediterranean.
- 5) Scarcity as the main hydroclimatic characteristic (with the repercussions that this imposes).
- 6) The need to base all this on a robust and effective system of governance of water resources that allows:
 - Define a clear framework of competencies.
 - Correct administrative coordination.
 - The guarantee of participation of all the actors involved.
 - Well-defined economic-financial regime with which to operate.



Thank you for your attention !!



Ramiro Martínez

General Coordinator

Mediterranean Network of Basin Organizations - MENBO



www.remoc.org



MINISTÈRE DE L'AGRICULTURE,
DES RESSOURCES HYDRAULIQUES
ET DE LA PÊCHE



WORLD BANK GROUP



GWSP
GLOBAL WATER
SECURITY & SANITATION
PARTNERSHIP

Atelier sur la gestion de la sécheresse. Tunis, Tunisie. 30 Avril 2018